1. A method of operating a deposition system comprising:

positioning a patterned substrate on a wafer table within a processing chamber;

creating a high density plasma in the processing chamber, wherein the high density plasma comprises ions of coating material and a large number of process gas ions;

exposing the patterned substrate to the high-density plasma;

performing a Low Net Deposition (LND) process, wherein a target power or a substrate bias power, or a combination thereof, is adjusted to establish an LND deposition rate, the LND deposition rate comprising an ultra-low deposition rate in a field area of the patterned substrate; and

depositing material into features of the patterned substrate while producing substantially no overhanging material at feature openings.

2. The method of operating a deposition system as claimed in claim 1, wherein the LND process comprises an LND pre-process time, an LND processing time, or an LND post-process time, or a combination thereof, wherein the LND pre-process time varies from approximately 0 seconds to approximately 50 seconds; the LND processing time varies from approximately 10 seconds to approximately 500 seconds; and the LND post-process time varies from approximately 0 seconds to approximately 5000 seconds.

3. The method of operating a deposition system as claimed in claim 2, wherein the LND processing time is greater than approximately 150 seconds and less than approximately 250 seconds,

4. The method of operating a deposition system as claimed in claim 2, wherein the deposition system further comprises a substrate bias generator coupled to the wafer table, the method further comprising:

adjusting the LND substrate bias power to a first value in a range below a sputtering threshold during at least a portion of the LND processing time, wherein the LND substrate bias power can range from approximately 0 w to approximately 200 w.

5. The method of operating a deposition system as claimed in claim 2, wherein the deposition system further comprises a target, and a target power source providing LND target power to the target, the method further comprising: adjusting the LND target power to achieve the LND deposition rate during at least a portion of the LND processing time, wherein the ultra-low deposition rate is less than 30 nm/min, the LND target power ranging from approximately 10 w to approximately 2000 w.

6. The method of operating a deposition system as claimed in claim 2, wherein the deposition system further comprises a pressure control system coupled to the processing chamber, the method further comprising:

establishing an LND chamber pressure during at least a portion of the LND processing time, wherein the LND chamber pressure is less than approximately 130 mTorr and greater than approximately 1 mTorr .

7. The method of operating a deposition system as claimed in claim 2, wherein the deposition system further comprises an antenna, a dielectric window coupled to the antenna and a wall of the processing chamber, a louvered deposition baffle coupled to the dielectric window, and a ICP source coupled to the antenna, the method further comprising:

operating the ICP source at a first frequency; and

adjusting the ICP source to provide an LND ICP power level for at least a portion of the LND processing time.

8. The method of operating a deposition system as claimed in claim 7, wherein the LND ICP power level is greater than approximately 3000 w and less than approximately 6000 w.

9. The method of operating a deposition system as claimed in claim 5, wherein the deposition system further comprises a target coupled to a wall of the processing chamber, a permanent magnet pack coupled to the target, and a DC source coupled to the target, the method further comprising:

setting a power output level for the DC source at a first LND target power level during at least a portion of the LND processing time, wherein the first LND target power level is greater than approximately 1000 w and less than approximately 3000 w.

10. The method of operating a deposition system as claimed in claim 2, wherein the deposition system further comprises a gas supply system coupled to the processing chamber, the method further comprising:

flowing a first process gas into the processing chamber during at least a portion of the LND processing time, wherein the first process gas comprises an inert gas, a nitrogen-containing gas, an oxygen-containing gas, or a metal-containing gas, or a combination thereof.

11. The method of operating a deposition system as claimed in claim 10, wherein the inert gas comprises argon, helium, krypton, helium, radon, or xenon, or a combination thereof.

12. The method of operating a deposition system as claimed in claim 10, wherein the metal-containing gas comprises tungsten (W), copper (Cu), tantalum (Ta), titanium, (Ti), ruthenium (Ru), iridium (Ir), aluminum (Al), silver (Ag), or lead (Pt), or a combination thereof.

13. The method of operating a deposition system as claimed in claim 1, wherein the LND process is used to deposit a barrier layer.

14. The method of operating a deposition system as claimed in claim 1, further comprising:

changing the process from an LND process to a No Net Deposition (NND) process, thereby changing the deposition rate from an LND deposition rate to an NND deposition rate, the NND deposition rate comprising a field deposition rate, a sidewall deposition rate, or a bottom surface deposition rate, or a combination thereof; and

processing the patterned substrate using the NND process, thereby depositing material on sidewalls of features of the patterned substrate or bottom surfaces of features of the patterned substrate, or a combination thereof, wherein a chamber pressure, chamber temperature, substrate temperature, a process gas chemistry, a process gas flow rate, a target material, an ICP power, substrate position, a target power, or a substrate bias power, or a combination thereof, is adjusted to change the process from the LND process to the NND process.

15. The method of operating a deposition system as claimed in claim 14, wherein the NND field deposition rate ranges from approximately -10 nm/min to approximately +10 nm/min.

16. The method of operating a deposition system as claimed in claim 15, wherein the NND field deposition rate ranges from approximately -5 nm/min to approximately +5 nm/min.

17. The method of operating a deposition system as claimed in claim 14, wherein the NND field deposition rate ranges from approximately -10 nm/min to approximately +10 nm/min.

18. The method of operating a deposition system as claimed in claim 19, wherein the NND field deposition rate ranges from approximately -5 nm/min to approximately +5 nm/min.

19. The method of operating a deposition system as claimed in claim 14, wherein the NND process comprises an NND pre-process time, an NND processing time, or an NND post-process time, or a combination thereof; wherein the NND pre-process time varies from approximately 0 seconds to approximately 50 seconds; wherein the NND processing time varies from approximately 10 seconds to approximately 500 seconds; and wherein the NND post-process time varies from approximately 0 seconds to approximately 5000 seconds.

20. The method of operating a deposition system as claimed in claim 19, wherein the NND processing time is greater than approximately 150 seconds and less than approximately 250 seconds.

21. The method of operating a deposition system as claimed in claim 19, further comprising: adjusting the substrate bias power to a second value above a second sputtering threshold during at least a portion of the NND processing time, wherein the substrate bias power ranges from approximately 500 w to approximately 1500 w.

22. The method of operating a deposition system as claimed in claim 21, wherein the substrate bias power ranges from approximately 750 w to approximately 900 w.

23. The method of operating a deposition system as claimed in claim 19, further comprising: adjusting the NND target power to a new value during at least a portion of the NND processing time, wherein the NND target power ranges from approximately 100 w to approximately 1500 w.

24. The method of operating a deposition system as claimed in claim 19, further comprising: adjusting the ICP source to provide an NND ICP power level for at least a portion of the NND processing time, wherein the NND DC power level ranges from approximately 2000 w to approximately 10000 w.

25. The method of operating a deposition system as claimed in claim 24, wherein the NND ICP power level ranges from approximately 3000 w to approximately 6000 w.

26. The method of operating a deposition system as claimed in claim 19, further comprising: establishing an NND chamber pressure during at least a portion of an NND processing time, wherein the NND chamber pressure is less than approximately 130 mTorr and greater than approximately 1 mTorr .

27. The method of operating a deposition system as claimed in claim 19, further comprising: flowing a second process gas into the processing chamber during at least a portion of the NND processing time, wherein the second process gas comprises an inert gas, a nitrogen-containing gas, an oxygen-containing gas, or a metal-containing gas, or a combination thereof.

28. The method of operating a deposition system as claimed in claim 27, wherein the inert gas comprises argon, helium, krypton, helium, radon, or xenon, or a combination thereof.

29. The method of operating a deposition system as claimed in claim 27, wherein the metal-containing gas comprises tungsten (W), copper (Cu), tantalum (Ta), titanium, (Ti), ruthenium (Ru), iridium (Ir), aluminum (Al), silver (Ag), or lead (Pt), or a combination thereof.

30. The method of operating a deposition system as claimed in claim 14, wherein the NND process is used to deposit a seed layer.

31. The method of operating a deposition system as claimed in claim 14, wherein the NND process is used to repair a seed layer.

32. The method of operating a deposition system as claimed in claim 14, wherein the NND process is used to repair a barrier layer.

33. The method of operating a deposition system as claimed in claim 14, wherein the NND process is used to deposit a barrier layer.

34. The method of operating a deposition system as claimed in claim 14, wherein the NND process is used to create a punch through in at least one of the features of the patterned substrate.

35. The method of operating a deposition system as claimed in claim 1, wherein the deposition system comprises an ionized physical vapor deposition (iPVD) processing chamber.

36. The method of operating a deposition system as claimed in claim 1, wherein the deposition system comprises a transfer system.

37. The method of operating a deposition system as claimed in claim 1, further comprising:

performing a second LND process, wherein a target power and a substrate bias power are adjusted to establish a second LND deposition rate in a field area of the patterned substrate; and

depositing additional material into features of the patterned substrate while producing substantially no overhanging material at feature openings.

38. The method of operating a deposition system as claimed in claim 1, further comprising:

positioning the patterned substrate on a second wafer table within a second processing chamber;

performing a second LND process, wherein a second target power and a second substrate bias power are adjusted to establish a second LND deposition rate in a field area of the patterned substrate; and

depositing additional material into features of the patterned substrate while producing substantially no overhanging material at feature openings.

39. The method of operating a deposition system as claimed in claim 14, further comprising:

performing a second NND process, wherein a second target power and a second substrate bias power are adjusted to create a second NND deposition rate, the NND deposition rate being approximately zero in the field area of the patterned substrate; and

processing the patterned substrate, thereby depositing additional material on sidewalls of features of the patterned substrate or bottom surfaces of features of the patterned substrate, or a combination thereof.

40. The method of operating a deposition system as claimed in claim 14, further comprising:

positioning the patterned substrate on a second wafer table within a second processing chamber;

performing a second NND process, wherein a second target power and a second substrate bias power are adjusted to create a second NND deposition rate, the NND deposition rate being approximately zero in the field area of the patterned substrate; and

processing the patterned substrate, thereby depositing additional material on sidewalls of features of the patterned substrate or bottom surfaces of features of the patterned substrate, or a combination thereof.

41. The method of operating a deposition system as claimed in claim 1, further comprising:

positioning the patterned substrate on a wafer table within an additional processing chamber; and

performing an additional process.

42. The method of operating a deposition system as claimed in claim 14, further comprising:

positioning the patterned substrate on a wafer table within an additional processing chamber; and

performing an additional process.

43. A method of operating a deposition system comprising:

positioning a patterned substrate on a wafer table within a processing chamber;

creating a high density plasma in the processing chamber, wherein the high density plasma comprises a large concentration of metal ions and a large number of process gas ions;

exposing the patterned substrate to the high-density plasma;

performing a No Net Deposition (NND) process, wherein a target power or a substrate bias power, or a combination thereof, is adjusted to establish an NND deposition rate, the NND deposition rate comprising an NND field deposition rate, an NND sidewall deposition rate, or an NND bottom surface deposition rate, or a combination thereof; and

processing the patterned substrate using the NND process, thereby depositing material on sidewalls of features of the patterned substrate or bottom surfaces of features of the patterned substrate, or a combination thereof, wherein a chamber pressure, chamber temperature, substrate temperature, a process gas chemistry, a process gas flow rate, a target material, an ICP power, substrate position, a target power, or a substrate bias power, or a combination thereof, is adjusted during the NND process.

44. The method of operating a deposition system as claimed in claim 43, wherein the NND field deposition rate ranges from approximately -10 nm/min to approximately +10 nm/min.

45. The method of operating a deposition system as claimed in claim 44, wherein the NND field deposition rate ranges from approximately -5 nm/min to approximately +5 nm/min.

46. The method of operating a deposition system as claimed in claim 43, wherein the NND field deposition rate ranges from approximately -10 nm/min to approximately +10 nm/min.

47. The method of operating a deposition system as claimed in claim 46, wherein the NND field deposition rate ranges from approximately -5 nm/min to approximately +5 nm/min.

48. The method of operating a deposition system as claimed in claim 43, wherein the NND process comprises an NND pre-process time, an NND processing time, or an NND post-process time, or a combination thereof, wherein the NND pre-process time varies from approximately 0 seconds to approximately 50 seconds; the NND processing time varies from approximately 10 seconds to approximately 500 seconds; and the NND post-process time varies from approximately 0 seconds to approximately 5000 seconds.

49. The method of operating a deposition system as claimed in claim 48, wherein the NND processing time is greater than approximately 150 seconds and less than approximately 250 seconds.

50. The method of operating a deposition system as claimed in claim 48, wherein the deposition system further comprises a substrate bias generator coupled to the wafer table, the method further comprising:

adjusting the NND substrate bias power to a first value above a sputtering threshold during at least a portion of the NND processing time, wherein the substrate bias power ranges from approximately 500 w to approximately 1500 w.

51. The method of operating a deposition system as claimed in claim 50, wherein the NND substrate bias power ranges from approximately 750 w to approximately 900 w.

52. The method of operating a deposition system as claimed in claim 48, wherein the deposition system further comprises a target, and a target power source providing NND target power to the target, the method further comprising:

adjusting the NND target power to a value to achieve the NND deposition rate during at least a portion of the NND processing time, wherein the NND target power ranges from approximately 100 w to approximately 1500 w.

53. The method of operating a deposition system as claimed in claim 48, wherein the deposition system further comprises a target coupled to a wall of the

processing chamber, a permanent magnet pack coupled to the target, and a DC source coupled to the target, the method further comprising:

adjusting the NND target power to a value to achieve the NND deposition rate during at least a portion of the NND processing time, wherein the NND target power ranges from approximately 100 w to approximately 1500 w.

54. The method of operating a deposition system as claimed in claim 48, wherein the deposition system further comprises a pressure control system coupled to the processing chamber, the method further comprising:

establishing an LND chamber pressure during at least a portion of the LND processing time, wherein the LND chamber pressure is less than approximately 100 mTorr and greater than approximately 1 mTorr .

55. The method of operating a deposition system as claimed in claim 48, wherein the deposition system further comprises an antenna, a dielectric window coupled to the antenna and a wall of the processing chamber, a louvered deposition baffle coupled to the dielectric window, and a ICP RF source coupled to the antenna, the method further comprising:

operating the ICP RF source at a first frequency; and

adjusting the ICP source to provide an NND ICP power level for at least a portion of the NND processing time.

56. The method of operating a deposition system as claimed in claim 55, wherein the NND ICP power level is greater than approximately 1000 w and less than approximately 10000 w.

57. The method of operating a deposition system as claimed in claim 56, wherein the NND ICP power level ranges from approximately 3000 w to approximately 6000 w.

58. The method of operating a deposition system as claimed in claim 48, wherein the deposition system further comprises a gas supply system coupled to the processing chamber, the method further comprising:

flowing a first process gas into the processing chamber during at least a portion of the LND processing time, wherein the first process gas comprises an inert gas, a nitrogen-containing gas, an oxygen-containing gas, or a metal-containing gas, or a combination thereof.

59. The method of operating a deposition system as claimed in claim 58, wherein the inert gas comprises argon, helium, krypton, helium, radon, or xenon, or a combination thereof.

60. The method of operating a deposition system as claimed in claim 58, wherein the metal-containing gas comprises tungsten (W), copper (Cu), tantalum (Ta), titanium, (Ti), ruthenium (Ru), iridium (Ir), aluminum (Al), silver (Ag), or lead (Pt), or a combination thereof.

61. The method of operating a deposition system as claimed in claim 43, wherein the NND process is used to deposit a barrier layer.

62. The method of operating a deposition system as claimed in claim 43, wherein the NND process is used to repair a barrier layer.

63. The method of operating a deposition system as claimed in claim 43, wherein the NND process is used to create a punch through in at least one of the features of the patterned substrate.

64. The method of operating a deposition system as claimed in claim 43, further comprising:

changing the process from an NND process to a Low Net Deposition (LND) process, thereby changing the deposition rate from an NND deposition rate to an LND deposition rate, the LND deposition rate comprising an LND field deposition rate, an LND sidewall deposition rate, or an LND bottom surface deposition rate, or a combination thereof, the LND field deposition rate comprising an ultra-low deposition rate in a field area of the patterned substrate; and

processing the patterned substrate using the LND process, thereby depositing material on a field area of the patterned substrate, sidewalls of features of the patterned substrate, or bottom surfaces of features of the patterned substrate, or a combination thereof, while producing substantially no overhanging material at feature openings, wherein a chamber pressure, chamber temperature, substrate temperature, a process gas chemistry, a process gas flow rate, a target material, an ICP power, substrate position, a target power, or a substrate bias power, or a combination thereof, is adjusted to change the process from the NND process to the LND process.

65. The method of operating a deposition system as claimed in claim 64, wherein the LND field deposition rate ranges from approximately 0 nm/min to approximately +50 nm/min.

66. The method of operating a deposition system as claimed in claim 65, wherein the LND field deposition rate ranges from approximately 0 nm/min to approximately +30 nm/min.

67. The method of operating a deposition system as claimed in claim 64, wherein the LND bottom surface deposition rate ranges from approximately -10 nm/min to approximately +10 nm/min.

68. The method of operating a deposition system as claimed in claim 67, wherein the LND bottom surface deposition rate ranges from approximately -5 nm/min to approximately +5 nm/min.

69. The method of operating a deposition system as claimed in claim 64, wherein the LND process comprises an LND pre-process time, an LND processing time, or an LND post-process time, or a combination thereof, wherein the LND pre-process time varies from approximately 0 seconds to approximately 50 seconds; the LND processing time varies from approximately 10 seconds to approximately 500 seconds; and the LND post-process time varies from approximately 0 seconds to approximately 5000 seconds.

70. The method of operating a deposition system as claimed in claim 69, wherein the LND processing time is greater than approximately 150 seconds and less than approximately 250 seconds.

71. The method of operating a deposition system as claimed in claim 69, further comprising: adjusting the LND substrate bias power to a second value in a range below a sputtering threshold during at least a portion of the LND processing time, wherein the LND substrate bias power can range from approximately 0 w to approximately 1000 w.

72. The method of operating a deposition system as claimed in claim 71, wherein the LND substrate bias power ranges from approximately 750 w to approximately 900 w.

73. The method of operating a deposition system as claimed in claim 69, further comprising: adjusting the LND target power to a new value during at least a portion of the LND processing time, wherein the LND target power ranges from approximately 10 w to approximately 2000 w.

74. The method of operating a deposition system as claimed in claim 73, wherein the LND target power ranges from approximately 800 w to approximately 1600 w.

75. The method of operating a deposition system as claimed in claim 69, further comprising: adjusting the ICP source to provide an LND ICP power during at least a portion of the LND processing time, wherein the LND ICP power ranges from approximately 2000 w to approximately 10000 w.

76. The method of operating a deposition system as claimed in claim 75, wherein the LND ICP power ranges from approximately 3000 w to approximately 6000 w.

77. The method of operating a deposition system as claimed in claim 69, further comprising: establishing an LND chamber pressure during at least a portion of an LND processing time, wherein the LND chamber pressure is less than approximately 100 mTorr and greater than approximately 1 mTorr .

78. The method of operating a deposition system as claimed in claim 69, further comprising: flowing an LND process gas into the processing chamber during at least a portion of the LND processing time, wherein the LND process gas comprises an inert gas, a nitrogen-containing gas, an oxygen-containing gas, or a metal-containing gas, or a combination thereof.

79. The method of operating a deposition system as claimed in claim 78, wherein the inert gas comprises argon, helium, krypton, helium, radon, or xenon, or a combination thereof.

80. The method of operating a deposition system as claimed in claim 78, wherein the metal-containing gas comprises tungsten (W), copper (Cu), tantalum (Ta), titanium, (Ti), ruthenium (Ru), iridium (Ir), aluminum (Al), silver (Ag), or lead (Pt), or a combination thereof.

81. The method of operating a deposition system as claimed in claim 64, wherein the LND process is used to deposit a seed layer.

82. The method of operating a deposition system as claimed in claim 64, wherein the LND process is used to repair a seed layer.

83. The method of operating a deposition system as claimed in claim 65, wherein the LND process is used to repair a barrier layer.

84. The method of operating a deposition system as claimed in claim 43, wherein the deposition system comprises an ionized physical vapor deposition (iPVD) processing chamber.

85. The method of operating a deposition system as claimed in claim 43, wherein the deposition system comprises a transfer system.

86. The method of operating a deposition system as claimed in claim 64, further comprising:

performing a second LND process, wherein a target power and a substrate bias power are adjusted to establish a second LND deposition rate in a field area of the patterned substrate; and

depositing additional material into features of the patterned substrate while producing substantially no overhanging material at feature openings.

87. The method of operating a deposition system as claimed in claim 64, further comprising:

positioning the patterned substrate on a second wafer table within a second processing chamber;

performing a second LND process, wherein a second target power and a second substrate bias power are adjusted to establish a second LND deposition rate in a field area of the patterned substrate; and

depositing additional material into features of the patterned substrate while producing substantially no overhanging material at feature openings.

88. The method of operating a deposition system as claimed in claim 43, further comprising:

performing a second NND process, wherein a second target power and a second substrate bias power are adjusted to create a second NND deposition rate, the NND deposition rate being approximately zero in the field area of the patterned substrate; and

processing the patterned substrate, thereby depositing additional material on sidewalls of features of the patterned substrate or bottom surfaces of features of the patterned substrate, or a combination thereof.

89. The method of operating a deposition system as claimed in claim 43, further comprising:

positioning the patterned substrate on a second wafer table within a second processing chamber;

performing a second NND process, wherein a second target power and a second substrate bias power are adjusted to create a second NND deposition rate, the NND deposition rate being approximately zero in the field area of the patterned substrate; and

processing the patterned substrate, thereby depositing additional material on sidewalls of features of the patterned substrate or bottom surfaces of features of the patterned substrate, or a combination thereof.

90. The method of operating a deposition system as claimed in claim 43, further comprising:

positioning the patterned substrate on a wafer table within an additional processing chamber; and

performing an additional process.

91. The method of operating a deposition system as claimed in claim 64, further comprising:

positioning the patterned substrate on a wafer table within an additional processing chamber; and

performing an additional process.

92. A method of processing semiconductor substrates by depositing material into features of the patterned substrate while producing substantially no overhanging material at feature openings, the method comprising:

positioning a patterned substrate on a wafer table within a processing chamber of an ionized physical vapor deposition (iPVD) system;

creating, in the processing chamber, a high density plasma of process gas ions that includes vaporized metal coating material having a high fraction of positive ions;

exposing the patterned substrate to the high-density plasma and performing therewith on the substrate an ionized physical vapor deposition process while controlling parameters of the iPVD system to establish a net

deposition rate on a field area of the patterned substrate of not more than approximately 30 nanometers per minute.

93. The method of claim 92 wherein:

the performing of the ionized physical vapor deposition process includes the depositing of a barrier layer on the sidewalls of vias or trenches on the substrate.

94. The method of claim 92 wherein:

the performing of the ionized physical vapor deposition process includes the depositing of a seed layer on the sidewalls of vias or trenches on the substrate.

95. The method of claim 92 wherein:

the performing of the ionized physical vapor deposition process includes controlling parameters of the iPVD system to establish a net zero deposition rate on a field area of the substrate.